Original Research Paper

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RENAL DYSFUNCTION IN BURN INJURIES SIGNIFICANCE OF HYPOVOLAEMIA, AZOTEMIA AND HYPERKALEAMIA

Plastic Surgery

KEYWORDS: Burn Injury, Acute Renal Failure, Kidney Dysfunction, Hypovolaemia, Azotemia, Hyperkalaemia

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ABSTRACT

Burn injury is a major cause of Acute renal failure. It is very common and leads to mortality. Finally it results in a complex interplay of various cellular and neuro – hormonal changes. In severe burn patients there will be a continuous homeostatic alteration. The aim of this study is to present the salient features in burn patients. There is a comprehensive understanding of the global physiologic changes underlying the condition of burn patients and a judicious interpretation of their continuous homeostatic alterations. Extensive burn injury encompass not only the coetaneous wound but also systemic changes associated with serious pathophysiological complications, one of which is acute renal failure [1] The incidence of acute renal failure in burn patients has been shown to vary widely from 1% to 30% and is associated with 73% to 100% mortality [2-5]. Acute renal failure as an abrupt decrease in the glomerular filtration rate (GFR) cause by intrinsic parenchymal disease or alterations in intrarenal hemodynamics. Its major manifestation is the accumulation of water, urea, creatinine, and potassium in the blood [6-10].

Introduction

Acute Renal Failure (ARF) is one of the most common serious complications in critical burn patients. In burn patients Acute Renal Failure (ARF) is a growing health concern as it is associated with both short and long term adverse effects. This frequently leads to extended intensive care unit stays and high mortality rates [7 -11]. Burn injuries encompass not only the coetaneous wound but also systemic changes associated with serious pathophysiological complications, one of which is acute renal failure. (ARF) The incidence of acute renal failure in burn patients has shown to vary widely from 10% to 30% and is associated with 70% to 100% mortality.

Acute Renal Failure (ARF) is defined as an abrupt decrease in the Glomerular Filtration Rate (GFR) caused by intrinsic parenchymal disease or alterations in internal [12-14] hemodynamics. It is a major manifestation is the accumulation of urea, creatinine and potassium) in the blood. Acute Renal Failure (ARF) that occurs immediately after burn is generally due to hypovolaemia related to extensive fluid losses from the burn wound, a fluid shift from the circulation into interstitial or intracellular spaces, or a delay in fluid resuscitation. Elevated levels of stress related hormones also cause vasoconstriction, fluid retention, and renal hypoperfusion with tubular necrosis leading to Acute Renal Failure (ARF) [15].

Materials and Methods

A total number of 300 burn children were admitted in burns ward / plastic surgery ward, Owaisi Hospital & Research Centre, a teaching hospital to Deccan College of Medical Sciences, Hyderabad, Telangana State, India, from these 18 were identified with acute renal failure defined as oliguria for 36 hours (urine output < 500 ml/kg of body weight per hour), a blood urea nitrogen serum creatinine ratio of less than 22, serum creatinine level greater than > 2 mg/dl. It is correlating contributing factor to mortality, such as patient characteristics, burn size, time from burn to fluid resuscitation, time from burn to wound excision, incidence of sepsis, and the type and duration of dialysis, were evaluated.

Table 1 Characteristics of Burn Children with and without Acute Renal Failure (ARF)

Characteristics	With ARF	Without ARF
Patients No.	18	272
Age year	7.9 + 1.1	7.5 + 1.0
Sex F/M	7/15	7/15
TBSA burn %	75 + 4	69 + 4
Third degree TBSA burn%	68 + 4	65 + 3

Data are presented as mean+_ SD p <0. 05

Table 2 Significance of Hypovolaemia, Azotemia and Hyperkaleamia

Characteristics	With ARF	Without ARF
Urine output	500 ml/day	800 ml/ day
Blood Urea Nitrogen	24 mg/dl	13 mg/dl
Serum Creatinine	2.8 mg/dl	0.8 mg/dl
Serum Potassium	5.4 mEq/L	3.8 mEq/L

Data are presented as mean + SD p <0. 05

Result

18 were identified with acute renal failure defined as oliguria for for 36 hours (urine output <500 ml/kg of body weight per hour), a blood urea nitrogen serum creatinine ratio of less than 22, serum creatinine level greater than > 2 mg/dl. Serum potassium level greater than > 5.0 mEq/L they are correlating contributing factor to mortality, such as patient characteristics, burn size, time from burn to fluid resuscitation, time from burn to wound excision, incidence of sepsis, and the type and duration of dialysis, were evaluated. Multiple conditions contribute to early Acute Renal Failure (ARF) in the burn patient such as hypovolaemia, azotemia and hyperkalaemia [16].

Fluid shift and hypovolaemia

Increased vascular permeability causes extensive fluid shift manifested as both local and generalized oedema. These results in renal oedema, followed by Acute Renal Failure and sodium - potassium pump impairment also participate in giving rise to generalized oedema. Excess free water given in this period lowers the tonicity of plasma, which also results in renal oedema, followed by Acute Renal Failure (ARF) [17]

Urine output is the main parameter in evaluating renal function. Generally a urine volume of 0.8 - 1.0 ml/kg/h reflects adequate perfusion pressure. In oliguric condition the urine volume is reduced due to Acute Renal Failure (ARF) in burn patients.

Azotemia

In burn patients early diagnosis of renal failue is very important. To evaluate renal failure, monitoring of glomerular and tubular functions of persistent proteinuria, and of urinary enzyme is recommended in addition to taking measurement of urine volume, blood urea nitrogen, and serum creatinine16 The blood urea nitrogen (BUN) and the serum creatinine levels are elevated (Azotemia) in burn patients due to Acute Renal Failure (ARF). Generally the blood urea nitrogen(BUN) are < 12 mg/l and the serum creatinine < 0.8 mg /dl reflect and increase in the levels of blood urea nitrogen (BUN) and serum creatinine [18].

Hyperkalaemia

Serum potassium level is increased > 6.0 mEq/L in burn patients due to Acute Renal Failure (ARF) [20].

Conclusion

Early adequate fluid resuscitation, early wound excision, and better infection control may reduce mortality in burns children with acute renal failure [19].

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